

Claims

- [c1] 1. A rubbing apparatus, comprising: a platform; a conveyor arranged on the platform; a based plate disposed on the conveyor; a rubbing roller arranged above the base plate and connected to the platform; a rubbing cloth disposed on a surface of the rubbing roller, wherein a surface of the rubbing cloth has a plurality of first pile fibers; a conditioning roller arranged aside to the rubbing roller, above the base plate and connected to the platform; and a conditioning cloth disposed on a surface of the conditioning roller, wherein a surface of the conditioning cloth has a plurality of second pile fibers, wherein the rubbing roller rotates in a first rotating direction opposite to a second rotating direction in which the conditioning roller rotates, and wherein a predetermined distance is arranged between the rubbing roller and the conditioning roller, so that the second pile fibers of the conditioning cloth on the conditioning roller are in contact with the first pile fibers of the rubbing cloth on the rubbing roller, thereby rejuvenating the rubbing cloth on the rubbing roller.
- [c2] 2. The apparatus of claim 1, wherein if the conditioning roller rotates clockwise, the rubbing roller rotates counter-clockwise.
- [c3] 3. The apparatus of claim 1, wherein if the conditioning roller rotates counter-clockwise, the rubbing roller rotates clockwise.
- [c4] 4. The apparatus of claim 1, wherein the second rotating speed of the conditioning roller is faster than the first rotating speed of the rubbing roller.
- [c5] 5. The apparatus of claim 1, wherein the conveyor is constructed to move the substrate on the base plate to a predetermined location.
- [c6] 6. The apparatus of claim 1, further comprising a cover plate under the conditioning roller to prevent the conditioning roller in contact with the substrate.
- [c7] 7. A liquid crystal display device comprising: a pair of substrate members, at least either one of the pair of substrate members being capable of transmitting light, and a liquid crystal disposed between the pair of substrate members, wherein at least either one of the substrate members includes an alignment

layer which is rubbed using a rubbing apparatus comprising: a rubbing roller having a rubbing cloth on a surface of the rubbing roller, wherein a surface of the rubbing cloth has a plurality of first pile fibers, wherein the rubbing roller to be moved together with the substrate member in relation to each other to thereby perform rubbing to the alignment layer; and a conditioning roller arranged aside to the rubbing roller, having a conditioning cloth on a surface of the conditioning roller, wherein a surface of the conditioning cloth has a plurality of second pile fibers, wherein the rubbing roller rotates in a first rotating direction opposite to a second rotating direction in which the conditioning roller rotates, and wherein a predetermined distance is arranged between the rubbing roller and the conditioning roller, so that the second pile fibers of the conditioning cloth on the conditioning roller are in contact with the first pile fibers of the rubbing cloth on the rubbing roller.

[c8] 8. The apparatus of claim 7, wherein if the conditioning roller rotates clockwise, the rubbing roller rotates counter-clockwise.

[c9] 9. The apparatus of claim 7, wherein if the conditioning roller rotates counter-clockwise, the rubbing roller rotates clockwise.

[c10] 10. The apparatus of claim 7, wherein the second rotating speed of the conditioning roller is faster than the first rotating speed of the rubbing roller.

[c11] 11. The apparatus of claim 7, further comprising a cover plate under the conditioning roller and above the substrate member to prevent the conditioning roller in contact with the substrate member.

[c12] 12. A method for manufacturing a liquid crystal display device, said method comprising: a first step of transporting a liquid crystal display substrate under a rubbing apparatus comprising a rotated rubbing roller and a rotating conditioning roller arranged aside to the rubbing roller, the liquid crystal display substrate having an alignment layer thereon, the rubbing roller having a rubbing cloth on a surface of the rubbing roller, wherein a surface of the rubbing cloth has a plurality of first pile fibers, so that the alignment layer is rubbed by the first pile fibers during rotation of the rubbing roller, the

conditioning roller having a conditioning cloth on a surface of the conditioning roller, wherein a surface of the conditioning cloth has a plurality of second pile fibers, so that the second pile fibers of the conditioning cloth on the conditioning roller are in contact with the second pile fibers of the rubbing cloth on the rubbing roller, and wherein the rubbing roller rotates in a first rotating direction opposite to a second rotating direction in which the conditioning roller rotates; a second step of binding a pair of substrates to each other, at least one of the pair of substrates having gone through rubbing in the first step; and a third step of injecting liquid crystal between the substrates.

[c13] 13. The method of claim 12, wherein if the conditioning roller rotates clockwise, the rubbing roller rotates counter-clockwise.

[c14] 14. The method of claim 12, wherein if the conditioning roller rotates counter-clockwise, the rubbing roller rotates clockwise.

[c15] 15. The method of claim 12, wherein the second rotating speed of the conditioning roller is faster than the first rotating speed of the rubbing roller.

[c16] 16. The method of claim 12, wherein the rubbing apparatus further comprises a cover plate under the conditioning roller and above the liquid crystal display substrate to prevent the conditioning roller in contact with the substrate.